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INTRODUCTION

After deregulation in the United States in 1978, airlines faced intense competition on previously regulated routes. The proponents of deregulation stated that equilibrium in the industry would be achieved by providing lower fares and improved service (Daraban and Fournier, 2008). While this became true to some extent, the airline network in the U.S. was dominated by the hub-and-spoke system and concentrated in the hands of few large airlines. The emergence of the Low-Cost Carrier (LCC) model, which originated in the U.S. through Southwest Airlines in the early 1970s, became an instrument to drive the airlines towards a competitive equilibrium. The LCC model was later adapted by the European market with the Irish carrier Ryanair in 1991, followed by the U.K.-based easyJet in 1995.

The airline industry is very volatile. The U.S. Government Accountability Office (GAO), which is an independent agency that works for U.S. Congress, reported that in 2008 the U.S. passenger airline industry lost $5.6 billion due to volatility of fuel prices and the economic recession. This downturn was followed by airline profits starting in 2009. The GAO stated that "although the financial performance of individual airlines differed, network airlines as a whole generated operating profits of approximately $12 billion from 2007 through 2012, while low-cost airlines and regional airlines generated profits of approximately $6.1 billion and $3.6 billion respectively over the same period" (GAO, 2014).

Boeing Market Outlook (2014) indicated that passenger traffic continues to rebound from the 2008-2009 economic downturn. According to Boeing, "overall U.S. passenger traffic has averaged 2 percent growth per year since 2009, ahead of capacity growth, which ranged from 1 to 2 percent per year over the same period. Capacity growth of the low-cost carriers (LCC) continues to outpace network carriers, averaging 4 percent in 2013, compared with 1 percent for network carriers" (Boeing, 2014). Abda et al. (2012) stated that the low-cost airline's share of U.S. domestic market is still growing, but is starting to level off. The average number of LLCs per U.S. airport initially increased from 0.5 in 1990 to 2.8 in 2005.

Dealing with prospective LCC entrants is a critical issue for global network carriers. The LCC's choice of which market to enter depends on the barriers to entry, including the reaction of network carriers. The strategic decisions of incumbents and new entrants were investigated by a number of researchers (Coad and Teruel, 2013; Malighetti et al., 2009; Daraban and Fournier, 2008; Goolsbee and Syverson, 2008). The decline in air fares is driven by the entry of LCC into new markets (Snider and Williams, 2011). LCC entry creates competition and as a result reduces both the business and leisure fares of full-service carriers (Alderioghi et al., 2012).

The U.S. government and the airline industry pay close attention to the reaction of carriers to the new entrant. The U.S. Department of Transportation restricts predatory practices under the Antitrust Law, which protects consumers and businesses from predatory business practices and promotes fair competition in an open-market economy. As such, the established carrier should react to new entrants in a way that will remain within legal competitive practices and not be classified as predatory, designed to drive new entrants out of the market. Lin et al (2001) stated that the major problem is to distinguish between those two areas.

This research paper will extend the existing body of literature on the strategic decision making of established carriers when they face a potential LCC entrant. These carriers must make the strategic decision of whether to deter or to accommodate the LCC entrant move. Good decisions require that each decision-maker accurately predict the strategic moves of the other parties (McMillan, 1996). While much research has been done investigating the airline behavior in the hub-and-spoke system, this paper contributes to the literature by investigating airlines in operation with LCC entry at the less congested airports in the U.S., where three to six carriers usually operate.

Additionally, this research paper investigates five market characteristics and their effect on the airlines' fares, contributing to the potential success or failure of the LCC entrant. These market characteristics include the length of the average flight of a particular airline (stage length), number of passengers, number of competitors, number of stops, and oil price.

The report is structured as follows: an overview of literature on airline competitive behavior and market characteristics influencing fares; an overview of the selected airlines airports under investigation; the methodology behind the research questions and propositions; analysis and presentation of findings for two-stage research with the relevant discussion; and the conclusion.

REVIEW OF LITERATURE

Airline Behavior

The aviation industry is very dynamic. LCC and airlines attempting a hybrid strategy are common in the short and medium haul aviation markets. Curtis and Rhoades (2013) stated that it seems that the establishment of LCCs follows a natural industry progression and a country's economic development. The LCC model seeks to achieve a competitive advantage through the reduction of operating costs below the traditional airline model. LCCs tend to pursue growth through innovative business models including lower operating costs, which result in the reduction of air fares. This stimulates air travel demand by improving the affordability and accessibility of air travel in already established markets.

A number of studies investigated the competitive strategies of businesses and what affects airlines fares. Airlines' behavior for pricing plays a large role in competition. Lin et al (2001) stated that literature on airline competitive behavior comes from three sources: industrial organizational economics, strategy and marketing. Lin et al (2001) researched the determinants of price reactions to entry. While some research found evidence for predatory behaviors by major airlines, others found little evidence.

Good decisions require that each decision-maker accurately predict the strategic moves of the other parties (McMillan, 2000). The network carriers have a choice whether to deter or to accommodate the LCC entrant move, and whether to use their strategies independently or in collaboration. With a new entrant in the market, airlines can play a game. They can form a coalition of players, which can result in the cooperative game, or they can display non-cooperative behavior. A game depends on the other airlines strategies employed, and can have different strategies for different players. Network carriers can cooperate to deter LCC entry by threatening or attempting to erect barriers and other obstacles that signal to LCC that entry will not be profitable cooperation. Another scenario that one of the network carriers will cooperate with LCC if doing so will drive the other network carrier out of market (the collusion between network carriers, and the collaboration between one of the network and LCC). Additionally, two network carriers can cooperate in signaling LCC entry to the market if the future profits of all three airlines can be increased (the cooperation). Axelrod (1992) defined "Tit for Tat" strategy, based on simple reciprocity, which cooperates on the first move and then does whatever the other player did on the previous move. Axelrod investigated that successful strategy include "the avoidance of unnecessary conflict by cooperating as long as the other player does, provocability in the face of an uncalled for defection by the other, forgiveness after responding to a provocation, and clarity of behavior so the other player can recognize and adapt to your pattern of action" (p.2-3).

Airline entry strategy will have an impact on the incumbent airline's response. Daraban and Fournier (2008) conducted research on incumbent responses to low-cost airline entry and exit. The research demonstrated that incumbents significantly reduced air fares before and after LCC entry. This was especially the case with the entry of Southwest Airlines, when compared with the entry of other LCCs. The researchers concluded that pre-entry cut in fares was not to prevent LCC entry, but to capture important market shares and get a good reputation before LCC entry. The post-entry air fares indicate that most of the competitive effect or the effect of competition was observed about three fiscal quarters after the LCC entry. The adjustment process takes place fast, with the new equilibrium fares achieved one or two quarters after the entry.

Ito and Lee (2003) investigated two primary airline responses to LCC entry: pricing behavior and capacity decision. Dresner et al. (2002) findings indicated that the largest price cuts by major airlines with the LCC entry occur when the LCC offers their service at a large discount compared to the existing on the market prices. Windle and Dresner (1995) indicated that Southwest Airlines entrance resulted in 48% decrease in average fare and a 200% increase in passenger traffic. It has been a common practice for incumbents to match the new entrant fares. Additionally, incumbent carriers often either start using larger aircraft or add additional flight frequencies on the LCC entrant routes (Bergantino and Capozzaz, 2013). However, predatory behavior is illegal and occurs if an incumbent airline responds to an entrant by lowering its prices below its costs and forcing the entrant to accrue financial losses and exit the market (Ito and Lee, 2003).

Lin et al (2001) investigated 889 incumbent reactions to entry in the U.S. The findings indicated that the size of the entrant's price cut was the most significant indicator for the incumbent's price cut. Other important factors are the size of the entrant and the size of incumbents, the entrant cost structure and the number of complaints. If the entrant has a low cost advantage, then the incumbent's price cuts are less likely to work. On the other hand, when a larger carrier enters a market, the incumbent responds with a larger price cut. Additionally, the larger incumbents react less aggressively than smaller airlines to new entrant's price cuts. Basically, incumbents are more aggressive towards the larger new entrant with higher costs.

Ito and Lee (2003) find that highly aggressive incumbent reactions are exceptions, and that response to LCC entrants on average tends to be fairly accommodating. They also find no evidence that incumbents' pricing decisions or capacity expansion with LCC entry negatively impacts the probability of LCC exit from the market. The entrant success or failure is ultimately determined by the LCC capacity, pre-existing market density and LCC pre-entry presence at the endpoint of a market. Access to airport facilities, such as gates, is also an important factor.

On the other hand, Tan (2012) noted that legacy carriers react differently to LCC entry than LCC carrier incumbents. LCC entrants tend to undercut legacy carriers while matching the prices of LCC incumbents. Legacy carriers tend to decrease their average airfare before and after entry by LCC. However, LCCs do not significantly change their prices in response to entry by another LCC. Ito and Lee (2003) stated the incumbents' fare responses might be smaller due to the limitation of using average fares. Legacy carriers tend to have more differentiated fare structures than LCCs by offering different classes of service. Moreover, incumbents match the price cuts of LCCs on a limited inventory basis. Research has found that different strategies are implemented by different LCCs. Frontier appears to utilize a "cream skimming" strategy, entering on a small scale and only moderately cutting price, while AirTran appears to be more aggressive in terms of capacity and fare reduction (Ito and Lee, 2003). The nature of competition will depend on LCC entry strategy.

Kwoka et al. (2012) found that the fare competition in the airline industry in the U.S. is driven by the LCC segment. Legacy carriers play a large role in the fare determination and are influenced by the LCCs and other carriers. The collective share of LCCs in the market and its structure are important, whether one or more LCCs are present in the market. A more concentrated LCC segment is linked to a smaller fare reduction. Competition among LCCs is different from major carriers (Kwoka et al., 2012). Kwoka et al. (2012) found that major airline fares are not affected much by other majors, while LCCs drive down major airline fares substantially, especially Southwest Airlines. LCC prices are not constrained by major airlines, while LCCs compete against each other in the price determination.

Overall, Gorin and Belobaba (2005) concluded that it is very difficult to evaluate predatory behavior in airline markets using traditional approaches based on revenues and costs. Revenue management and flows of network passengers is very complex and might affect research based on average fares, revenues or traffic. Gorin and Belobaba (2005) stated that their research results have shown that these traditional measures provide little information regarding the behavior of incumbents and their response to LCCs entry. Airline strategies before and after the LCC entrant are affected by a large number of factors including revenue management, entrant capacity relative to incumbent carrier capacity, pricing strategy, and flows of network passengers.

Market Characteristics

In order to assess competition in an industry, the following market characteristics have to be considered:

- "the average number of effective competitors in different segments of the market;
- the types of airlines, including the presence of network and low-cost airlines, in the market;
- airline market share of passengers at the route and airport level;
- barriers to entry, including practices or conditions that may impede a firm's ability to enter a market" (GOA, 2014).

Airline markets differ by the level of competitiveness, entry barriers, the presence of slot – controlled airports, the type of customers on the route, the other airports in the area, and other factors (Lin et al, 2001). Competition from potential competitors, connect service and adjacent-airports service is also important in understanding airline competition (Kwoka et al., 2012).

A high level of competition is linked to the slot controls at airports where the fares will be generally higher. The high level of competition, which links to the number of competitors and their routes, will push fares down and therefore may limit the fare response with the new entrant. If an alternate airport is nearby to the airport under investigation, then the carriers in operation might not cut their prices, preferring to switch to the nearby airport (Lin et al, 2001). Airport congestion can also be a factor. Lin at al. (2001) proposed that at congested, gate-restricted airports, the price cut by incumbents might be smaller because the congestion might limit new entrants ability to gain market share.

Borenstein (1989) proposed a model using market share at the route and airport level. Market share influences an airlines' ability to raise fares since airline dominance at the airport increases its market share on the routes. LCC carriers usually fly point to point and not through a hub, and as such the total distance flown is less than that which a network carrier would fly. Therefore, the addition of a shorter, non-stop point to point route should result in a lower fare. However, the hub option, used by the incumbent carriers, generally offers more options to travelers and can be seen as more flexible. For passengers who choose to fly this route, they may experience what is known as a hub premium and this could result in the increased air fares. “Based on a comparison of fares at 10 dominated hub airports, DOT estimated that 24.7 million passengers in hub markets with no low-fare competitor paid on average 41 percent more than those flying in hub markets with low-fare competitors. Passengers in short-haul hub markets (750 miles or less) without a low-fare carrier on average pay even more.” (GAO, 2001).

Brueckner et al. (2013) find that most forms of legacy-carrier competition have weak effects on average fares, while LCC competition had a significant fare impact either on the airport-pair or at adjacent airports (Brueckner, 2013). Morrison (2001) stated that airlines can influence air fares on a route in three ways: serving the route, serving an adjacent route that can be perceived as substitution, or lower air fares in general to deter the entrant and potential competitor.

Increasing oil prices will continue to affect all airlines, especially as the percentage of total operating costs increases as a result of fuel price (CAPA, 2009). “Fuel costs rose for both network and low-cost airlines during the recent recession, and now comprise a greater percentage of airlines’ operating costs. From 2007 through 2012, for example, fuel costs grew from 31 to 38 percent of operating costs for low-cost airlines, and from 26 to 29 percent of network airline operating costs” (GOA, 2014). As an example, for Southwest Airlines, the largest low-cost airline, fuel costs grew from 30% of operating costs in 2007 to 37% percent in 2012. As a result, it became harder for LCC’s to keep prices low if they wanted to keep up. “Low-cost airlines have not achieved the same cost reductions since 2007 that network airlines have accomplished, and instead have experienced rising unit costs” (GOA, 2014). The impact of higher fuel prices has been greater for LCCs because those airlines reduced aircraft utilization, or the average number of hours that an aircraft is in flight in a 24-hour period.

AIRLINES AND AIRPORTS

Low Cost Carriers in the United States were identified using the LCC CAPA database (see Table 1).

Table 1 LCC in the United States

	IATA Code	Airline	Principal Hub
1	FL	AirTran Airways, TX	Hartsfield-Jackson Atlanta International Airport
2	G4	Allegiant Air, NV	Las Vegas McCarran International Airport
3	F9	Frontier Airlines, CO	Denver International Airport
4	B6	JetBlue Airways, NY	New York John F Kennedy International Airport
5	WN	Southwest Airlines, TX	Chicago Midway International Airport
6	NK	Spirit Airlines, FL	Fort Lauderdale-Hollywood International Airport
7	VX	Virgin America, CA	San Francisco International Airport

Source: CAPA database

Using CAPA Centre for Aviation, secondary U.S. airports with 2-5 airlines in operation (including LCCs) were identified. Only few airports were selected due to availability of published fares (see Table 2).

Table 2 Secondary Airports Summary

		LCC	Entry	LCC	Entry	LCC	Majors
1.	McGhee Tyson Airport, TN	AirTran	Q2 2009	Frontier	Q3 2007	2	4
2.	Newport News/Williamsburg Intern Airport, VA	Frontier	Q3 2010			1	3
3.	Palm Spring International Airport, CA	Frontier	Q3 2010	Virgin America	Q4 2011	2	4
4.	Portland International Airport, OR	JetBlue	Q2 2006	Southwest		2	3
5.	Richmond International Airport, VA	AirTran	Q2 2005	JetBlue	Q1 2006	2	4
6.	Sarasote Bradenton International Airport, FL	JetBlue	Q4 2006			1	4
7.	Westchester County Airport, NY	AirTran	Q2 2006	JetBlue	Q1 2007	2	4
8.	Atlantic City International Airport, NJ	AirTran	Q2 2009	Spirit		2	1
9.	Capital Region International Airport, MI	Frontier	Q4 2013	Sun Country	Q4 2010	2	2
10.	McAllen Miller International Airport, TX	Allegiant	Q3 2005			1	2

Three airports (Atlantic City International, Capital Region International and McAllen Miller International) did not have fares available in the MasFlight database, and were therefore removed from the research.

McGhee Tyson Airport, TN

The airport was opened in 1927 with the first commercial flight operated in 1937. The airport is owned and operated by the Metropolitan Knoxville Airport Authority, which was established in 1978. The airport is located 12 miles south of Knoxville, Tennessee in Alcoa. Knoxville has a population of 184,281 according to the U.S. Census Bureau (2015). However, Alcoa is part of the Knoxville, Tennessee metropolitan area, which this airport also serves and had an estimated population of 852,715 people in 2013.

The non-stop domestic destinations from McGhee Tyson Airport (TYS) are Atlanta, Charlotte, Chicago, Dallas/Ft. Worth, Detroit, Sanford, Houston, Washington DC (both airports), Denver, and Minneapolis St. Paul. The nearest airports within 200 miles of TYS are Nashville International Airport (176 miles), Tri-Cities Regional Airport (100 miles), Chattanooga Metropolitan Airport (103 miles) and Asheville Regional Airport, NC (123 miles).

Airport operational data is presented in Table 3.

Table 3 McGhee Tyson Airport (TYS)

Summary Data (U.S. Flights Only)					Carrier Shares, Oct 2012-Sep 2013****		
Passengers*	2012**	2013**	%Chg	Rank***	Carrier	PAX	Share
Arrival	846k	813k	-3.87%	91	ExpressJet	501	31%
Departure	849k	818k	-3.65%	91	PSA	333	20%
Scheduled Flights					Pinnacle	205	13%
Departures	19,896	18,801	-5.50%	84	Allegiant	204	13%
Freight/Mail (lb.) (Scheduled and Non-Scheduled)					American Eagle	178	11%
Total	106m	95m	-10.45%	69	Other	210	13%
Carriers							
Scheduled	20	17	-15%				

* Scheduled enplaned revenue passengers.
** 12 months ending September of each year.
*** Among 804 U.S. airports, 12 months ending September 2013
****Based on enplaned passengers (000) both arriving and departing.
Source: Bureau of Transportation Statistics, 2015

Newport News/Williamsburg International Airport, VA

Commercial service here began in 1949 with Piedmont Airlines. At that time, the airport was called Patrick Henry Airport. It was renamed first in the mid 1970s and then in 1990 as Newport News/Williamsburg International Airport. It is operated by the Peninsula Airport Commission, which was created in 1946. The airport is located 9 miles northwest of downtown Newport News, Virginia and serves the Hampton Roads metropolitan area in Virginia, which includes Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach and Williamsburg, and the counties of Gloucester, Isle of Wight, James City, Southampton, Surry and York. A part of this also covers a small part of North Carolina's Hampton Roads metropolitan has an estimated population of 1,707,369 people according to the U.S. Census Bureau.

The deregulation significantly affected the airport, causing all of its jet passenger services to be removed. Airlines eventually came back with traffic of over 1 million passengers at its highest point. However, its biggest carrier, AirTran, ceased operations in 2012 and resulted in a decline in passenger count flying in and out of the airport.

The nearest airports within 200 miles are Richmond International Airport (60 miles), Ronald Reagan Washington National Airport (169 miles), Washington Dulles International Airport 173 miles), Norfolk International Airport (28 miles), Charlottesville Albemarle Airport (146 miles), Pitt-Greenville Airport (153 miles), Salisbury-Ocean City Wicomico Regional Airport (154 miles) and Coastal Carolina Regional Airport (177 miles).

Airport operational data is presented in Table 4.

Table 4 Newport News/Williamsburg International Airport (PHF)

Summary Data (U.S. Flights Only)					Carrier Shares, Oct 2012 - Sep 2013****		
Passengers*	2012**	2013**	%Chg	Rank***	Carrier	PAX	Share
Arrival	376k	274k	-27.12%	155	ExpressJet	146	27%
Departure	365k	273k	-25.20%	155	Wisconsin	143	26%
Scheduled Flights					Piedmont	75.93	14%
Departures	7,662	6,516	-14.96%	160	Frontier	62.45	11%
Freight/Mail (lb.) (Scheduled and Non-Scheduled)					PSA	46.71	9%
Total	32k	33k	2.38%	542	Other	71.84	13%
Carriers							
Scheduled	9	7	-22.22%				

* Scheduled enplaned revenue passengers.
** 12 months ending September of each year.
*** Among 804 U.S. airports, 12 months ending September 2013
****Based on enplaned passengers (000) both arriving and departing.
Source: Bureau of Transportation Statistics, 2015

Palm Springs International Airport, CA

Passenger flights began here in 1945 with Western airlines. The airport was purchased in 1961 by the City of Palm Springs from the military and named Palm Springs Municipal Airport. The airport is located 2 miles east of downtown Palm Springs, California and has population of 46,854 (U.S. Census Bureau, 2015). It also located in the Inlands Empire area of southern California, a Riverside county which has a population of 2,329,271 people.

The airport is a favorite tourist destination and therefore a lot of the operations are seasonal. The top destinations are: San Francisco, Phoenix, Seattle, Dallas/Fort Worth, Denver, Los Angeles, Chicago, Portland, Salt Lake City and Minneapolis, Vancouver, Winnipeg, Calgary and Toronto. The nearest airports within 200 miles to PSP are LA/Ontario International Airport (72 miles), John Wayne Airport (100 miles), San Diego International Airport (145 miles), Imperial County Airport (102 miles), Long Beach Airport (114 miles), McClellan-Palomar Airport (117 miles).

Airport operational data is presented in Table 5.

Table 5 Palm Springs International Airport (PSP)

Summary Data (U.S. Flights Only)					Carrier Shares, Oct 2012 - Sep 2013****		
Passengers*	2012**	2013**	%Chg	Rank***	Carrier	PAX	Share
Arrival	733k	757k	3.29%	96	SkyWest	612	40%
Departure	736k	761k	3.42%	95	Alaska	347	23%
Scheduled Flights					American	269	18%
Departures	12,435	12,347	-0.71%	108	Allegiant	75.69	5%
Freight/Mail (lb.) (Scheduled and Non-Scheduled)					Horizon Air	48.56	3%
Total	253k	294k	16.38%	391	Other	166	11%
Carriers							
Scheduled	13	12	-7.69%				

* Scheduled enplaned revenue passengers.
** 12 months ending September of each year.
*** Among 804 U.S. airports, 12 months ending September 2013
****Based on enplaned passengers (000) both arriving and departing.
Source: Bureau of Transportation Statistics, 2015

Portland International Airport, OR

The current site of the airport was purchased in 1936 by the Portland City Council. The city of Portland has had two other airports: Swan Island Municipal Airport and Portland-Columbia Airport. Passenger service began as early as 1957. It is located about 12 miles northeast of downtown Portland. The city of Portland has a population of 619,360 people (U.S. Census Bureau, 2015). However, it also serves the Portland Metropolitan Area, which consists of the cities of Vancouver, Gresham, Hillsboro and Beaverton with a total population of 2,314,554.

Portland International Airport serves both civil and military traffic and is the largest commercial airport in the state of Oregon. The top ten domestic destinations are San Francisco, CA, Seattle/Tacoma, WA, Denver, CO, Phoenix, AZ, Los Angeles, CA, Las Vegas, NV, Chicago (O'Hare), IL, Salt Lake City, UT, San Jose, CA and Atlanta, GA. Some international destinations are Amsterdam, Frankfurt, Puerto Vallarta and Tokyo.

The nearest airports within 200 miles are: Seattle-Tacoma International Airport (162), Kenmore Air Harbor Seaplane Base (175 miles), Eugene Airport (130 miles), Roberts Field (144 miles) and King County International Airport (167 miles).

Airport operational data is presented in Table 6.

Table 6 Portland International Airport (PDX)

Summary Data (U.S. Flights Only)					Carrier Shares, Oct 2012 – Sep 2013****		
Passengers*	2012**	2013**	%Chg	Rank***	Carrier	PAX	Share
Arrival	6,814k	7,110k	4.34%	29	Southwest	2,674	19%
Departure	6,807k	7,105k	4.38%	29	Alaska	2,645	19%
Scheduled Flights					Horizon Air	2,602	18%
Departures	83,118	83,316	0.24%	29	United	1,673	12%
Freight/Mail (lb.) (Scheduled and Non-Scheduled)					Delta	1,398	10%
Total	418m	422m	0.82%	21	Other	3,222	23%
Carriers							
Scheduled	21	20	-4.76%				

* Scheduled enplaned revenue passengers.
** 12 months ending September of each year.
*** Among 804 U.S. airports, 12 months ending September 2013
****Based on enplaned passengers (000) both arriving and departing.
Source: Bureau of Transportation Statistics, 2015

Richmond International Airport, VA

The airport was dedicated in 1927 and named after Admiral Richard Byrd. It is owned and operated by the Capital Region Airport Authority created in 1975 and is the busiest airport in central Virginia. It serves as a combined public civil-military airport. The first regularly scheduled passenger services began in 1932 with Eastern Airlines. The airport is located in Sandston, Virginia but the largest city near it is Richmond, Virginia with a population of 214,853 (U.S. Census Bureau, 2015).

Some of the top destinations from Richmond International Airport include Atlanta, Charlotte, Chicago, Boston, Dallas/Fort Worth, Philadelphia, Orlando, New York, Detroit, Newark, Tampa and Washington D.C. The nearest airports with 200 miles are: Ronald Reagan Washington National Airport (115 miles), Washington Dulles International Airport (119 miles), Baltimore/Washington International Thurgood Marshall Airport (149 miles), Raleigh-Durham International Airport (161 miles), Newport News/Williamsburg International Airport (60 miles), Charlottesville Albemarle Airport (87 miles) and Norfolk International Airport (87 miles).

Airport operational data is presented in Table 7.

Table 7 Richmond International Airport (RIC)

Summary Data (U.S. Flights Only)					Carrier Shares, Oct 2012 - Sep 2013****		
Passengers*	2012**	2013**	%Chg	Rank***	Carrier	Passengers	Share
Arrival	1,553k	1,561k	0.48%	69	Delta	674	21%
Departure	1,569k	1,575k	0.42%	69	ExpressJet	417	13%
Scheduled Flights					AirTran	302	10%
Departures	28,810	27,672	-3.95%	63	JetBlue	251	8%
Freight/Mail (lb.) (Scheduled and Non-Scheduled)					US Airways	236	8%
Total	111m	123m	11.45%	60	Other	1,258	40%
Carriers							
Scheduled	28	22	-21.4%				

* Scheduled enplaned revenue passengers.
** 12 months ending September of each year.
*** Among 804 U.S. airports, 12 months ending September 2013
****Based on enplaned passengers (000) both arriving and departing.
Source: Bureau of Transportation Statistics, 2015

Sarasota Bradenton International Airport, FL

The airport dates back to 1939 when local government from Sarasota and Manatee counties decided to construct an airport to service both counties. It is operated by Sarasota Manatee Joint Airport Authority. Commercial passenger service began as early as 1940, however jet service was only introduced in 1965 by National Airlines. The word “international” was added to the airport in 1992. The largest cities near the airport are Sarasota (3 miles north) and Bradenton (6 miles south). The city of Sarasota has a population of 54,214, the city of Bradenton has a population of 52,769 and the county has 390,962 people (U.S. Census Bureau, 2015).

The top destinations include New York, Boston, Atlanta, Chicago, Washington D.C, Charlotte, Toronto, Montreal, Frankfurt, London and Paris. The nearest airports within 200 miles are: Tampa International Airport (51 miles), Southwest Florida International Airport (93 miles), Orlando International Airport (125 miles), Orlando Sanford International Airport (156 miles), St. Petersburg-Clearwater International Airport (43 miles), Charlotte County Airport (63 miles), and Naples Municipal Airport (121 miles).

Airport operational data is presented in Table 8.

Table 8 Sarasota Bradenton International Airport (SRQ)

Summary Data (U.S. Flights Only)					Carrier Shares, Oct 2012 - Sept 2013****		
Passengers*	2012**	2013**	%Chg	Rank***	Carrier:	Passengers	Share
Arrival	637k	563k	-11.64%	110	Delta	619	55%
Departure	646k	570k	-11.79%	110	JetBlue	259	23%
Scheduled Flights					PSA	75.13	7%
Departures	6,308	5,490	-12.97%	177	United	71.52	6%
Freight/Mail (lb.) (Scheduled and Non-Scheduled)					Mesa	39.84	4%
Total	438k	402k	-8.07%	367	Other	67.78	6%
Carriers							
Scheduled	8	12	50.00%				

* Scheduled enplaned revenue passengers.
** 12 months ending September of each year.
*** Among 804 U.S. airports, 12 months ending September 2013
****Based on enplaned passengers (000) both arriving and departing.

Source: Bureau of Transportation Statistics, 2015

Westchester County Airport, NY

The airport was re-opened for civil operation in 1945, but the first flight took off in 1948 with American Airlines. It continued as a joint military-civil airport until 1983 when the suburban area of Westchester began expanding. The airport is located 5 miles east of White Plains, NY and 30 miles north of New York. It serves suburban Westchester County, which has a population of 972,634 people (U.S. Census Bureau, 2015). It also serves the Fairfield County area in Connecticut, which includes large cities such as Bridgeport, Stamford, Norwalk and Danbury and has a combined population of 939,904 people. Finally, it also services the New York Metropolitan area, which has a population of 23,484,225 people.

The following destinations are served by the airlines from Westchester County Airport: Chicago, IL, Hyannis, MA, Lebanon, NH, Martha's Vineyard, MA, Nantucket, MA, Provincetown, MA, Atlanta, GA, Detroit, MI, Orlando, FL, Tampa, FL, West Palm Beach, FL, Charlotte, SC, Philadelphia, PA, and Washington, DC. The nearest airports within 200 miles are: LaGuardia Airport (31 miles), John F. Kennedy International Airport (38 miles), Newark Liberty International Airport (48 miles), Bradley International Airport (97 miles), Teterboro Airport (36 miles), Tweed New Haven Regional Airport (55 miles), Stewart International Airport (62 miles), Morristown Municipal Airport (65 miles) and Long Island MacArthur Airport (67 miles).

Airport operational data is presented in Table 9.

Table 9 Westchester County Airport (HPN)

Summary Data (U.S. Flights Only)					Carrier Shares, Oct 2012 – Sept 2013****		
Passengers*	2012**	2013**	%Chg	Rank***	Carrier	Passengers	Share
Arrival	913k	744k	-18.54%	98	JetBlue	724	48%
Departure	917k	752k	-18.05%	97	ExpressJet	235	16%
Scheduled Flights					Wisconsin	100	7%
Departures	18,368	15,501	-15.61%	94	Chautauqua	95.72	6%
Freight/Mail (lb.) (Scheduled and Non-Scheduled)					Pinnacle	87.57	6%
Total	34k	37k	8.07%	531	Other	253	17%
Carriers							
Scheduled	16	12	-25.00%				

* Scheduled enplaned revenue passengers.
** 12 months ending September of each year.
*** Among 804 U.S. airports, 12 months ending September 2013
****Based on enplaned passengers (000) both arriving and departing.
Source: Bureau of Transportation Statistics, 2015

Overall airports summary is presented in Appendix A Table 20.

METHODOLOGY

This research was conducted in two stages.
Stage 1: The effect of a low carrier entry on airlines at the selected small-sized U.S. domestic airports.

> Quarterly air fares were collected for the airlines operating in the market one year prior LCC entry and two years after.

Stage 2: The influence of select indicators on airfares with LCC entry.

> Dependent variable: The average fares of airlines flying in the same market as LCC entrant.
>
> Predictor variables: Stage length, number of passengers in economy class, number of competitors in the same market, number of stops, and oil price.

Major airlines origin-destinations were matched with the origin-destinations of LLCs for the same airport. For each identified airport, the following route-specific data was obtained using MasFlight database:

1. The average quarterly one-way fare in economy class one year prior to LCC entry and two years afterwards including data for LCC
2. Stage length including middle point (the length of the average flight of a particular airline)
3. Number of stops
4. Number of competitors
5. The price of crude oil, WTI Cushing Oklahoma (U.S. Department of Energy)
6. The average quarterly number of passengers in economy class one year prior to LCC entry and two years afterwards

Research questions:

a. Which of the five variables are included in an equation for predicting fares of airlines flying in the same market as LCC entrant?
b. Does the obtained regression equation resulting from a subset of the five predictor variables allow a reliable prediction of the fare behavior of airlines operating in the same market following LCC entrance?

Based on the literature review, the following five propositions are presented. Airline fares will increase with:

1. An increase in the stage length (the longer the route, the higher the costs and the higher the fare).
2. A decrease in the number of passengers in economy class (less passengers result in higher fare).
3. A decrease in the number of competitors in the market (less competitors, higher fare).
4. A decrease in the number of stops (the fewer the stops, the higher the fare).
5. An increase in oil price (the higher the oil price, the higher the fare).

Stepwise multiple regression or statistical multiple regression is used in the research that is exploratory in nature (Mertler and Vannatta, 2005, p.170). The research has a set of predictor variables to determine which specific independent variables make meaningful contributions to the overall prediction of the model. There are three variations of stepwise regression: forward selection, stepwise selection and backward deletion. Field (2009, p.213) suggested using the backward method because of suppressor effects, which occur when a predictor has a significant effect when another variable is held constant. In contrast, forward method runs a higher risk of making a Type II error, which is missing a predictor that can predict the outcome.

Backward deletion method first computes an equation with all predictors, followed by a significance test or a partial F-test for every predictor to determine the level of contribution to the overall prediction. Then the partial F of the predictor is compared to the pre-selected value. Based on the analyses of F-values, the predictor can be removed from the analysis. The process continues until significant predictors remain in the equation.

ANALYSIS AND PRESENTATION OF FINDINGS

<u>Stage 1 Research</u>

Stage 1 of the research investigated the effect of a low carrier entry on airlines at the selected seven U.S. domestic airports.

McGhee Tyson Airport, TN

Frontier Airlines entry Q3 2007
The results of the analyses indicated that three airlines (Delta, US Airways and American Airlines) increased their fares with Frontier Airlines entry in the first year, while Untied had a slight decrease. In the second year of Frontier operation, most airlines decreased their fares with the exception of United Airlines (see Figure 4 and Table 13).

Figure 1 Fare change with Frontier Airlines

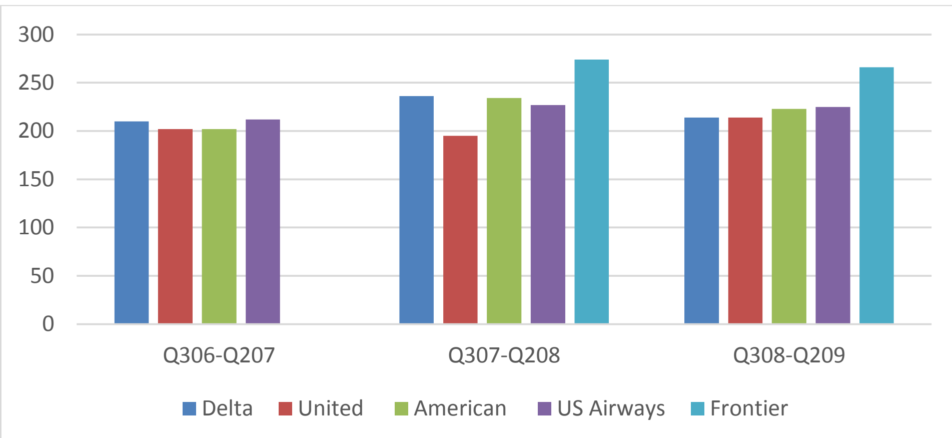


Table 10 Percent change in fares with Frontier Airlines entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Air Lines	12%	-9.32%
United Airlines	-3%	9.74%
US Airways	16%	-4.70%
American Airlines	7%	-0.88%
Frontier Airlines (entrant)		-2.92%

AirTran Airways entry Q2 2009
The results of the analyses indicated that the fares of airlines under the investigation (Delta, United and US Airways), had a significant decrease in the first year with AirTran Airways entry, followed by the fare increase in the second year (see Figure 2 and Table 11).

Figure 2 Change in fares with AirTran Airways entry

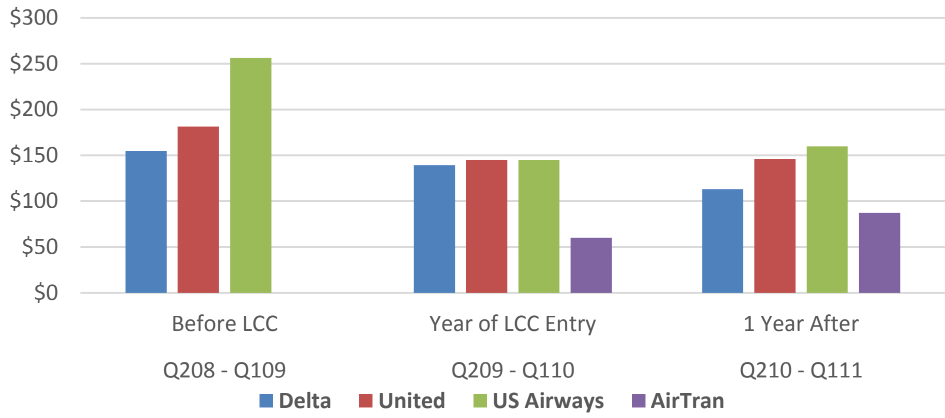


Table 11 Percent change in fares with AirTran Airways entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Air Lines	-10%	-19%
United Airlines	-20%	1%
US Airways	-43%	10%
AirTran Airways (entrant)		46%

Newport News/Williamsburg Intern Airport, VA

Frontier Airlines entry Q3 2010
The results of the analyses indicated that out of three airlines under the investigation (Delta, United and US Airways), two airlines (Delta and United) had fares decrease in the first year with Frontier Airlines entry, while US Airways had a slight fare increase. In the second year of operation, all airlines including Frontier had their fares increased (see Figure 3 and Table 12).

Figure 3 Fare Change with Frontier Airlines entry

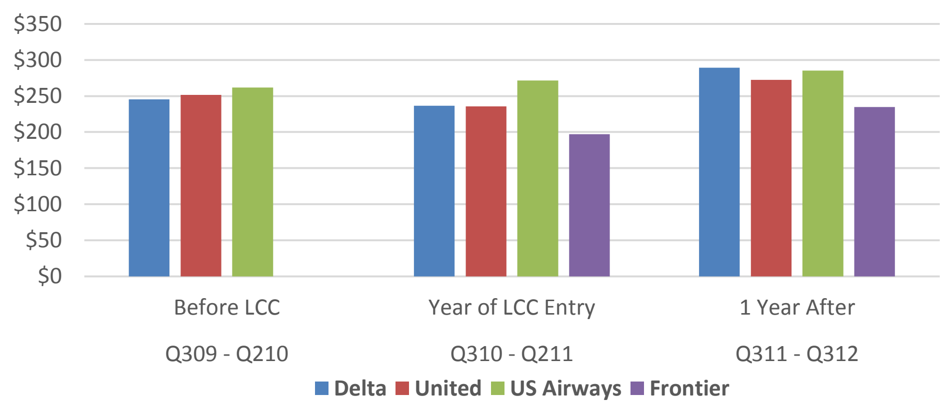


Table 12 Percent change in fares with Frontier Airlines entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Air Lines	-3.60%	22.29%
United Airlines	-6.32%	15.44%
US Airways	3.62%	5.11%
Frontier Airlines (entrant)		18.99%

Palm Spring International Airport, CA

Frontier Airlines entry Q3 2010

The results of the analyses indicated that two airlines (Delta and US Airways), which served the same market as Frontier Airlines, increased their fares with Frontier Airlines entry in the first year. Delta Air Lines had a decrease, while US Airways had an increase in the second year (see Figure 4 and Table 13).

Figure 4 Fare Change with Frontier Airlines entry

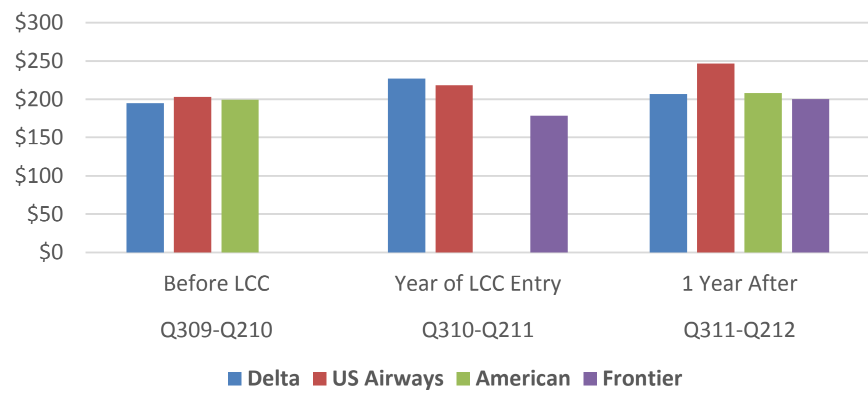


Table 13 Percent change in fares with Frontier Airlines entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Airlines	16.37%	-8.83%
American Airlines*		4.35%
US Airways	7.39%	12.98%
Frontier Airlines (entrant)		12.14%

*AA did not fly to same destinations as Frontier in the 1st year if operations. Hence the % change in fare is the difference between the year 3 and the year 1.

Virgin America entry Q4 2011

The results of the analyses indicated that out of three airlines under the investigation (Delta, US Airways and Alaskan Airlines), only Alaskan Airlines decreased its fares with the Virgin America entry in the first year, followed by an increase in the second year. Delta Air Lines had increases each year, while US Airways had an increase in the first year followed by a decrease in fares in the second year (see Figure 5 and Table 14). American Airlines did not have common routes with Virgin America, therefore was not included in the analyses. It is interesting to note that Virgin America had a slight decrease in fares in its second year of operation.

Figure 5 Fare Change with Virgin America entry

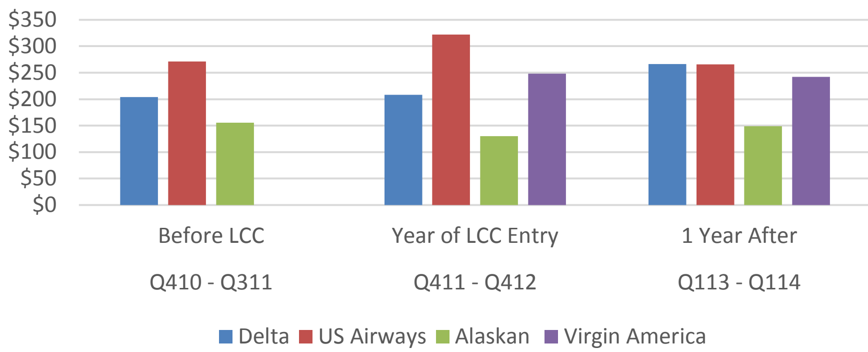


Table 14 Percent change in fares with Virgin America entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Air Lines	1.86%	27.98%
US Airways	18.85%	-17.58%
Alaskan Airlines	-16.20%	14.37%
Virgin America (entrant)	0.00%	-2.46%

Portland International Airport, OR

JetBlue Airways entry Q2 2006

The results of the analyses indicated that three airlines under the investigation (Delta, United and US Airways) reduced their fares in the first year and increased in the second year after JetBlue Airways entered the market (see Figure 6 and Table 15).

Figure 6 Fare Change with JetBlue Airways entry

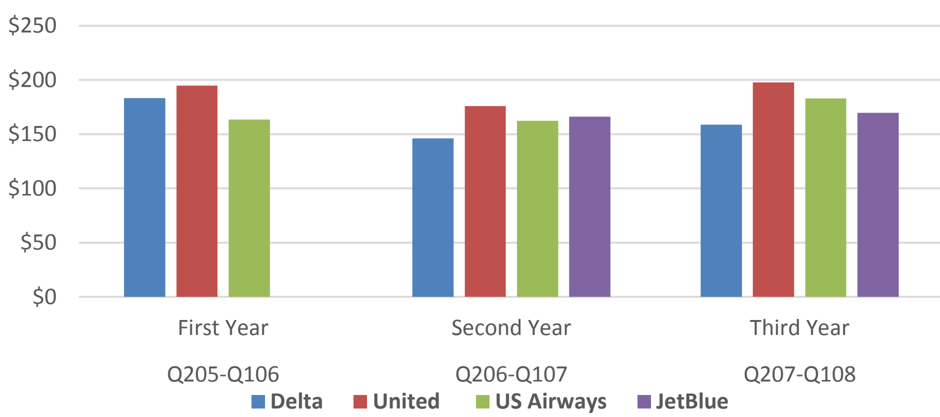


Table 15 Percent change in fares with JetBlue entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Air Lines	-20.23%	8.59%
United Airlines	-9.72%	12.41%
US Airways	-0.80%	12.80%
JetBlue Airways (entrant)		2.18%

Richmond International Airport, VA

AirTran Airways entry Q2 2005

The results of the analyses indicated that out of four airlines under investigation (Delta, United, US Airways and American), Delta Airlines decreased its fares with AirTran Airways entry in the first year. American Airlines and United Airlines had insignificant fare changes, while US Airways increased their fares. In the second year, all four airlines had fare increases while the entrant AirTran Airways decreased their fares (see Figure 7 and Table 16).

Figure 7 Fare Change with AirTran Airways entry

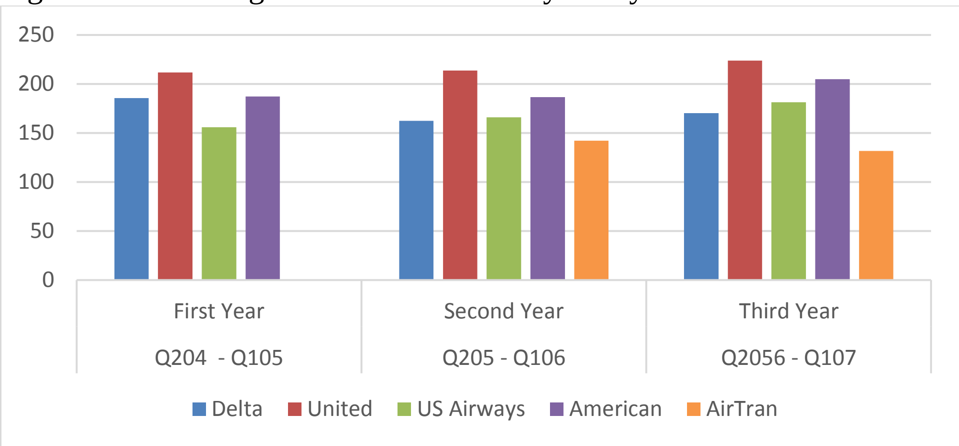


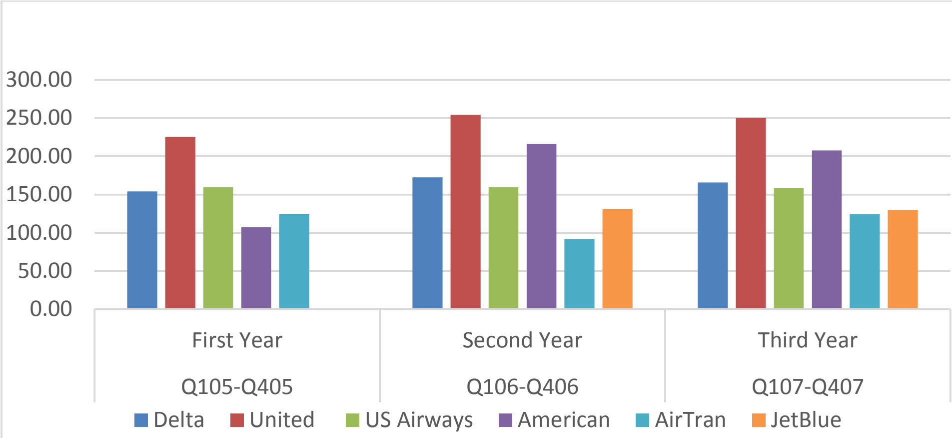
Table 16 Percent change in fares with AirTran Airways entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Air Lines	-12.41%	4.76%
United Airlines	0.86%	4.88%
US Airways	6.4%	9.41%
American Airlines	-0.37%	9.87%
AirTran Airways (entrant)		-7.36%

JetBlue Airways entry Q1 2006

The results of the analyses indicated that out of five airlines under investigation (Delta, United, US Airways, American, and AirTran Airways) four airlines increased their fares, while Air Tran Airways, which is LLC, had reduction in fares. In the second year of JetBlue entry most airlines had decreased their fares including JetBlue Airways with the exception of AirTran Airways which had a fare increase (see Figure 8 and Table 17).

Figure 8 Fare Change with JetBlue Airways entry



AirTran Airways data from Q2 2005

Table 17 Percent change in fares with JetBlue Airways entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Air Lines	11.74%	-3.82%
United Airlines	12.65%	-0.02%
US Airways	0.06%	-1.57%
American Airlines	17.84%	-3.86%
AirTran Airways	-26.12%	35.69%
JetBlue Airways		-1.52%

Sarasota Bradenton International Airport, FL

JetBlue Airways entry Q4 2006

The results of the analyses indicated that out of four airlines under investigation (American, Delta, United, and US Airways) two airlines increased their fares (American and US Airways), while another two airlines (Delta and United) had fare decreases. In the second year of JetBlue entry, three airlines including the entrant decreased fares, while two airlines (United and US Airways) had fares increase (see Figure 9 and Table 18).

Figure 9 Fare Change with JetBlue Airways entry

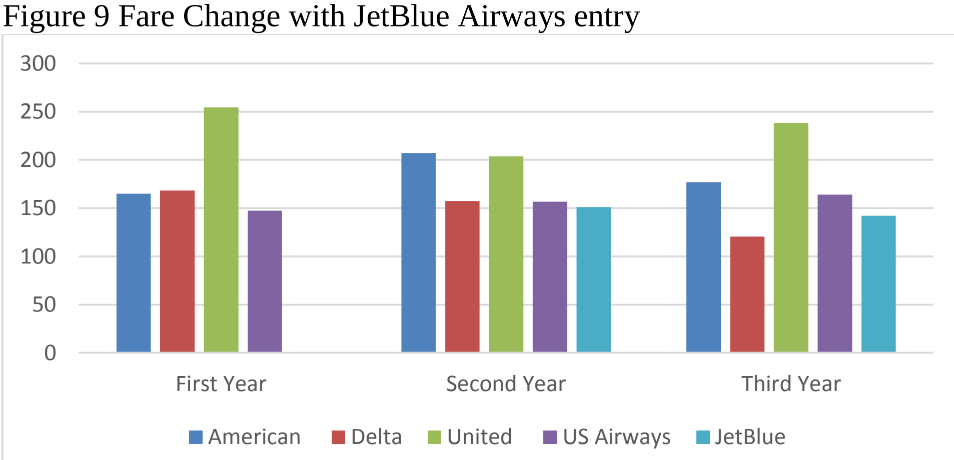


Table 18 Percent change in fares with JetBlue entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
American Airlines	25.45%	-14.49%
Delta Air Lines	-6.56%	-23.33%
United Airlines	-19.95%	16.97%
US Airways	6.1%	4.78%
JetBlue Airways (entrant)		-6.06%

Westchester County Airport, NY

AirTran Airways entry Q2 2006

The results of the analyses indicated that while Delta Air Lines and US Airways had a slight increase in fares with the AirTran Airways entry, United Airlines had a slight decrease in the first year. In the second year, airlines including AirTran Airways had decreases with the exception of Delta Air Lines, which had a slight increase in fares (see Figure 10 and Table 19). American Airlines did not serve the same market at AirTran Airways and was not included.

Figure 10 Fare Change with AirTran Airways entry

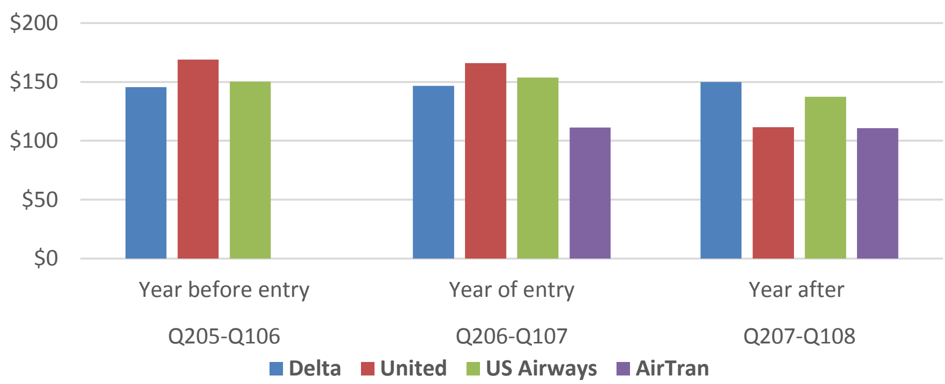


Table 19 Percent change in fares with AirTran entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Air Lines	0.7%	2.1%
United Airlines	-1.9%	-32.7%
US Airways	2.5%	-10.7%
AirTran Airways (entrant)		-0.7%

JetBlue Airways entry Q1 2007

The results of the analyses indicated that out of four airlines under investigation (Delta, United, US Airways and AirTran Airways) three had fare decreases in the first year with the exception of Delta Air Lines. Delta had a fare increase with JetBlue Airways entry. In the second year, Delta, United and JetBlue decreased their fares, while US Airways and AirTran Airways increased their fares (see Figure 11 and Table 20).

Figure 11 Fare Change with JetBlue Airways entry

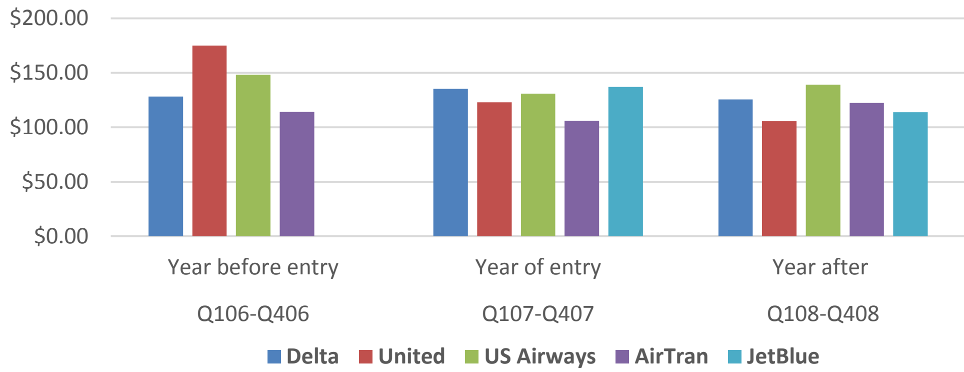


Table 20 Percent change in fares with JetBlue entry

% Change in fares	Yr. before entry - Yr. of entry	Yr. of entry - 1 yr. after
Delta Air Lines	5.56%	-7.07%
United Airways	-29.79%	-14.14%
US Airways	-11.75%	6.22%
AirTran Airways	-7.27%	15.45%
JetBlue Airways (entrant)		-16.94%

Discussion of the Stage 1 Results

The purpose of this stage of research was to investigate airline behavior or competitive reaction by established airlines when they face an LCC entrant in the less congested, small-sized U.S. regional airports with only few airlines in operation. The results of analyses indicated that there were no specific patterns discovered in airline behavior in a market with LCC entry. While some airlines decreased their fares in the first year following the entrant, other airlines demonstrated fare increases. No pattern was discovered in the second year of operation as well. In addition, the LCC itself demonstrated either fares increases or decrease in the second year of operation. Airlines have competition on routes. One of the limitations of this research is that the average market fares will not correctly reflect airline behavior because airlines are competing on the individual routes. Seasonality, day of the week and time of the flight are also play a large role in airline revenue management.

<u>Stage 2 Research</u>

The second stage of the research investigated five indicators, such as the stage length, number of passengers in economy class, number of competitors, number of stops and price of oil, and its effect on the fares of airlines in the market with LCC entry.

McGhee Tyson Airport, TN

Frontier Airlines entry Q3 2007
Airlines in operation in the same market**:** Delta Air Lines, US Airways, American Airlines, United Airlines, and Air Tran Airways (from Q2 2009).

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines in operation with the Frontier Airlines market entry in Q3 2007 (see Appendix B Table 21).

Regression analysis indicates an overall model of three predictors out of five variables (stage length, number of passengers in economy class, and number of competitors in the market) that significantly predict fare behavior of airlines operating in the same market, R^2=0.103, R^2adj.= .097, F(3,407)= 15.624, p<.001. The model accounts for 10% of variance in fares of airlines with the LCC Frontier Airlines entry.

Beta coefficients indicate that the airlines' fares will increase with an increase in the stage length, and decreases in the number of competitors in the market and number of passenger in economy class.

AirTran Airways entry Q2 2009
Airlines in operation in the same market: Delta Air Lines, US Airways, and United Airlines. Frontier Airlines was excluded from the analysis since its market is different from AirTran Airways.

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the AirTran Airways market entry (see Appendix B Table 22). Regression analysis indicates an overall model of three variables (number of passengers in economy class, number of competitors, and WTI) that significantly predict fare behavior of airlines operation in the same market, R^2=0.711, R^2adj.= .669, F(3,21)= 17.201, p<.001.

The model accounts for 71% of variance in fares of airlines with the LCC AirTran Airways market entry. Beta coefficients indicate that major airlines' fares will increase with decreases in the number of passengers, number of competitors in the market, and the oil price.

Newport News/Williamsburg International Airport, VA

Frontier Airlines entry Q3 2010
Airlines in operation in the same market: Delta Air Lines, US Airways, and United Airlines.

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the Frontier Airlines market entry (see Appendix C Table 23). Regression analysis indicates an overall model of two variables (WTI and the stage length) that significantly predict fare behavior of airlines operation in the same market, R^2=0.110, R^2adj.= 0.104, F(2,304)= 18.743, p<.001.

The model accounts for 11% of variance in fares of airlines with the LCC Frontier Airlines market entry. Beta coefficients indicate that major airlines' fares will increase with increases in WTI and the stage length.

Palm Spring International Airport, CA

Virgin America entry Q4 2011
Airlines in operation in the same market: American Airlines, Delta Air Lines, US Airways, and Frontier Airlines (entry Q3 2010).

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the Virgin America market entry (see Appendix D Table 24). Regression analysis indicates the overall model of three variables (stage length, WTI, and the number of economy passengers) that significantly predict fare behavior of airlines operating in the same market, $R^2=0.252$, $R^2adj.= .245$, $F(3,301)= 33.876$, $p<.001$. The model accounts for 25% of variance in fares of airlines with the LCC Virgin America's entry. Beta coefficients indicate that the airlines' fares will increase with the increases in the stage length and the oil price, and decreases in the number of economy passengers.

Frontier Airlines entry Q3 2010
Airlines in operation in the same market: American Airlines, Delta Air Lines, US Airways, and Virgin America (Q4 2011 entry).

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the Frontier Airlines' market entry (see Appendix D Table 25). Regression analysis indicate an overall model of five variables (WTI, stage length, # Pax Economy, number of stops, and number of competitors) that significantly predict fare behavior of airlines operating in the same market, $R^2=0.37$, $R^2adj.= .359$, $F(5,277)= 32.593$, $p<.001$. The model accounts for 37% of variance in fares of airlines with the Frontier Airlines market entry. Beta coefficients indicate that the airlines' fares will increase with an increase in the stage length, number of competitors and increase in the oil price. Fares will decrease with a decrease in the number of stops and the number of economy passengers.

Portland International Airport, OR

JetBlue Airways entry Q2 2006
Airlines in operation in the same market: Delta Air Lines, US Airways, and United Airlines. Southwest Airlines data was not available in the MasFlight database.

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the JetBlue Airways' market entry (see Appendix E Table 26). Regression analysis indicates the overall model of five variables (WTI oil, number of stops, stage length, number of competitors and number of economy passengers) that significantly predict fare behavior of airlines operating in the same market, $R^2=0.235$, $R^2adj.= 0.226$, $F(5,416)= 25.536$, $p<.001$. The model accounts for almost 24% of variance in fares of major airlines with the LCC JetBlue Airways entry. Beta coefficients indicate that the airlines' fares will increase with increases in the stage length and the oil price, and decreases in the number of economy passengers, number of stops and number of competitors.

Richmond International Airport, VA

AirTran Airways entry Q2 2005
Airlines in operation in the same market: Delta Air Lines, US Airways, United Airlines and American Airlines.

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the AirTran Airways' market entry (see Appendix F Table 27). Regression analysis indicate the overall model of two variables (stage length and the number of stops) that significantly predict fare behavior of airlines operating in the same market, $R^2=0.384$, $R^2adj.= 0.380$, $F(2,364)= 113.297$, $p<.001$. The model accounts for almost 38% of variance in fares of major airlines with the LCC AirTran Airways entry. Beta coefficients indicate that the airlines' fares will increase with increases in the stage length and decreases in the number of stops.

JetBlue Airways entry Q1 2006
Airlines in operation in the same market: Delta Air Lines, US Airways, United Airlines, American Airlines and AirTran Airways.

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the JetBlue Airways' market entry (see Appendix F Table 28). Regression analysis indicate the overall model of only one variable (stage length) that significantly predict fare behavior of airlines operating in the same market, $R^2=0.226$, $R^2adj.= 0.215$, $F(1,72)= 21.052$, $p<.001$. The model accounts for almost 23% of variance in fares of major airlines with the LCC JetBlue Airways entry. Beta coefficients indicate that the airline's fares will increase with an increase in the stage length.

Sarasota Bradenton International Airport, FL

JetBlue Airways entry Q4 2006
Airlines in operation in the same market: Delta Air Lines, US Airways, United Airlines, and American Airlines.

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the JetBlue Airways' market entry (see Appendix G, Table 29). Regression analysis indicates the overall model of only one variable (number of stops) that predicts fare behavior of airlines operating in the same market.

Westchester County Airport, NY

AirTran Airways entry Q2 2006
Airlines in operation in the same market: Delta Air Lines, US Airways, and United Airlines, and American Airlines. Data for Cape Air was not available.

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the AirTran Airways' market entry (see Appendix H, Table 30). Regression analysis indicates the overall model of three variables (WTI, number of stops and the stage length) that significantly predict fare behavior of airlines operating in the same market, R^2=0.103, R^2adj.= 0.088, F(3,181)= 6.914, p<.001. The model accounts for almost 10% of variance in fares of major airlines with the AirTran Airways entry. Beta coefficients indicate that the airlines' fares will increase with decreases in WTI, number of stops and the stage length.

JetBlue Airways entry Q1 2007
Airlines in operation in the same market: Delta Air Lines, US Airways, and United Airlines.

Backward multiple regression was conducted to determine which independent variables were the predictors of the fare behavior for the airlines with the JetBlue Airways' market entry (see Appendix H, Table 31). Regression analysis indicates the overall model of only one variable (WTI), that significantly predict fare behavior of airlines operating in the same market, R^2=0.280, R^2adj.= 0.273, F(1,100)= 38.941, p<.001. The model accounts for almost 28% of variance in fares of major airlines with the JetBlue Airways entry. Beta coefficients indicate that the airlines' fares will increase with a decrease in WTI.

Discussion of the Stage 2 Results

The second stage of the research had five propositions and investigated the effect of indicators (stage length, number of passengers in economy class, number of competitors, number of stops and price of oil) on the fares of airlines in the market with LCC entry. The overall results of the analyses are presented in Appendix I Table 32.

Proposed Propositions: Fares of airlines will increase with

1. *An increase in the stage length (the longer the route, the higher the costs and the higher the fare).*

This proposition was supported. While most of the airlines had significant positive relations between the stage length and airfares (seven cases), airlines out of Westchester County Airport with Air Tran Airways entry displayed the opposite effect (the longer the route, the lower the fare).

2. *A decrease in the number of passengers in economy class (less passengers result in higher fares).*

This proposition was supported. Out of five cases of airlines flying from different airports who displayed significant relations between those two variable, all five were in support of this proposition.

3. *A decrease in the number of competitors in the market (less competitors results in higher fares).*

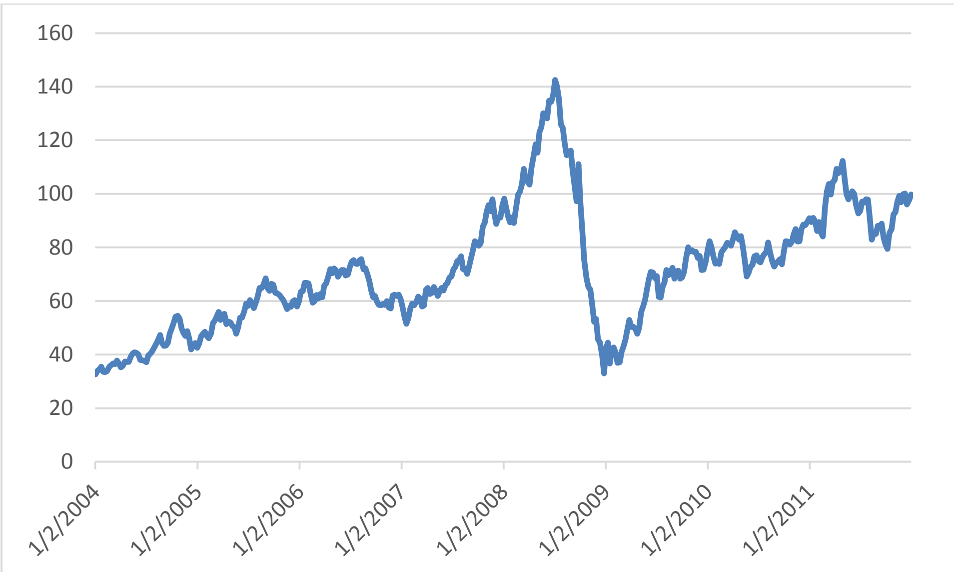
This proposition was supported. Out of three cases of airlines flying from different airports who displayed the significant relations, all three were in support of this proposition.

4. *A decrease in the number of stops (the fewer the stops, the higher the fare).*

This proposition was supported. Out of four cases of airlines flying from different airport who displayed significant relations, all four were in support of this proposition.

5. An increase in oil price (the higher the oil price, the higher the fare).
There were mix results for this proposition. While four cases displayed positive relations, other four displayed the opposite effect. Prices of West Texas Intermediate (WTI) crude oil, which is used as a benchmark in oil pricing, is presented in Figure 11.

Figure 11 WTI Crude Oil Price (Dollars per Barrel)



Source: U.S. Energy Information Administration, 2015

CONCLUSIONS

The competitive behavior of LCC entrants and incumbent airlines is a topic of interest for the industry and policy makers. Airlines can respond to the new entrant either with a price cut or capacity increase, not to maximize profits but to shut down the new competitor. The U.S. Department of Transportation has the guidelines for evaluating whether the airline behavior can be considered predatory.

GAO (2014) stated that as transportation demand has increased, capacity restraint has resulted in higher airfares. For example, average one-way domestic fares excluding taxes or other fees increased approximately 9% from $184.92 in 2007 to $201.00 in 2012 for network airlines, and approximately 17% from $117.37 to $137.00 for low-cost airlines (GAO, 2014, p.16). Prior research has demonstrated the effect of airline competition on airfares. It has shown that the presence of an LCC in the market is associated with lower fares. However, LCCs started having less influence on fares. According to the GAO, "while low-cost airlines continue to offer lower fares on average than network airlines, recent trends suggest that the fare-reducing effect of entry by the largest low-cost airline in certain markets may be waning" (GAO, 2014).

This paper focused on two main issues. First, it investigated airline behavior or competitive reaction by established airlines when they face an LCC entrant in the less congested, small-sized U.S. regional airports with only few airlines in operation. Second, it explained which of the selected market indicators were most likely to influence the airline fares out of small regional airports with the LCC entry. While the first stage of research demonstrated mix results and did not discovered any patterns in airline behavior with LCC entry due to a large number of other variables influencing airline revenue management, the second stage confirmed that the stage length, number of passengers, number of competitors, the number of stops and the oil price had an impact of airfares for airlines operating out of small regional airports. The surprising results of negative relations came from analysis of oil price and airline fares out of two airports: McGhee Tyson Airport with AirTran Airways entry, and Westchester County Airport with AirTran Airways and JetBlue Airways entry.

Good decisions require that each decision-maker accurately predict the strategic moves of the other parties (McMillan, 2000). The success of any company relies on its strategic decisions. This includes the interactions between managerial decision and decisions of other people. The aviation industry is very dynamic. How the LCC chooses which market to enter will depend on the barriers to entry, including the reaction of the established network carriers. Dealing with prospective LCC entrants is critical for global network carriers. LCCs tend to pursue growth through innovative business models including lower operating costs, which result in the reduction of air fares. This stimulates air travel demand by improving the affordability and accessibility of air travel in already established markets.

Appendix A

Table 20 Airports Summary

	Location	Large City Population (2014)	Metro Area 1,000 (2014)	Pax Movement 1,000 (2012)	Pax Movement 1,000 (2013)	Airports within 200 miles
McGhee Tyson Airport, TN	12 miles from Knoxville, TN	184,281	852	1,695	1,631	Nashville International Airport (176 mi), Tri-Cities Regional Airport (100 mi), Chattanooga Metropolitan Airport (103 mi) and Asheville Regional Airport, NC (123 mi).
Newport News/Williamsburg Intern Airport, VA	9 miles from Newport News, VA	182,020	1,707	741	547	Richmond International Airport (60 mi), Ronald Reagan Washington National Airport (169 mi), Washington Dulles International Airport (173 mi), Norfolk International Airport (28 mi), Charlottesville Albemarle Airport (146 mi), Pitt-Greenville Airport (153 mi), Salisbury-Ocean City Wicomico Regional Airport (154 mi) and Coastal Carolina Regional Airport (177 mi).
Palm Spring International Airport, CA	2 miles from downtown Palm Springs, CA	46,854	2,329	1,469	1,518	LA/Ontario International Airport (72 mi), John Wayne Airport (100 mi), San Diego International Airport (145 mi), Imperial County Airport (102 mi), Long Beach Airport (114 mi), and McClellan-Palomar Airport (117 mi).
Portland International Airport, OR	12 miles of downtown Portland, OR	619,360	2,314	13,621	14,215	Seattle-Tacoma International Airport (162 mi), Kenmore Air Harbor Seaplane Base (175 mi), Eugene Airport (130 mi), Roberts Field (144 mi) and King County International Airport (167 mi).
Richmond International Airport, VA	Sandston, VA and Richmond, VA	214,853	1,260 Richmond VA Metro Area	3,122	3,136	Ronald Reagan Washington National Airport (115 mi), Washington Dulles International Airport (119 mi), Baltimore/Washington International Thurgood Marshall Airport (149 mi), Raleigh-Durham International Airport (161 mi), Newport News/Williamsburg International Airport (60 mi), Charlottesville Albemarle Airport (87 mi) and Norfolk International Airport (87 mi).
Sarasota Bradenton International Airport, FL	Sarasota, 3 miles and Bradenton, FL 6 miles	Sarasota 54,214 & Bradenton 52,769	390	1,283	1,133	Tampa International Airport (51 mi), Southwest Florida International Airport (93 mi), Orlando International Airport (125 mi), Orlando Sanford International Airport (156 mi), St. Petersburg-Clearwater International Airport (43 mi), Charlotte County Airport (63 mi), and Naples Municipal Airport (121 mi).
Westchester County Airport, NY	5 miles of White Plains NY and 30 miles of New York	58,035 White Plains	23,484 New York Metro Area	1,830	1,496	LaGuardia Airport (31 mi), John F. Kennedy International Airport (38 mi), Newark Liberty International Airport (48 mi), Bradley International Airport (97 mi), Teterboro Airport (36 mi), Tweed New Haven Regional Airport (55 mi), Stewart International Airport (62 mi), Morristown Municipal Airport (65 mi) and Long Island MacArthur Airport(67 mi)

Appendix B: McGhee Tyson Airport, TN

Table 21 Frontier Airlines entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.323[a]	.105	.094	58.60973
2	.323[b]	.104	.096	58.54256
3	.321[c]	.103	.097	58.50989

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Pax Economy , # Competitors domest. market, # Stops
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Pax Economy , # Competitors domest. market
c. Predictors: (Constant), Stage Length, # Pax Economy , # Competitors domest. market

ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	162568.186	5	32513.637	9.465	.000[a]
	Residual	1391215.600	405	3435.100		
	Total	1553783.786	410			
2	Regression	162327.786	4	40581.946	11.841	.000[b]
	Residual	1391456.000	406	3427.232		
	Total	1553783.786	410			
3	Regression	160457.277	3	53485.759	15.624	.000[c]
	Residual	1393326.509	407	3423.407		
	Total	1553783.786	410			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Pax Economy , # Competitors domest. market, # Stops
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Pax Economy , # Competitors domest. market
c. Predictors: (Constant), Stage Length, # Pax Economy , # Competitors domest. market
d. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	268.922	43.170		6.229	.000
	Stage Length	.019	.007	.144	2.642	.009
	# Stops	5.082	19.211	.015	.265	.791
	# Pax Economy	-.022	.006	-.218	-3.703	.000
	# Competitors domest. market	-10.334	8.300	-.072	-1.245	.214
	WTI - Cushing, Oklahoma	-.303	.412	-.042	-.735	.463
2	(Constant)	273.784	39.017		7.017	.000
	Stage Length	.020	.007	.148	2.837	.005
	# Pax Economy	-.022	.005	-.224	-4.250	.000
	# Competitors domest. market	-10.498	8.267	-.073	-1.270	.205
	WTI - Cushing, Oklahoma	-.304	.412	-.042	-.739	.460
3	(Constant)	262.247	35.736		7.339	.000
	Stage Length	.020	.007	.151	2.894	.004
	# Pax Economy	-.022	.005	-.225	-4.266	.000
	# Competitors domest. market	-13.946	6.819	-.097	-2.045	.041

a. Dependent Variable: Fare Avg. Economy (ow)

Table 22 AirTran Airways entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.855[a]	.731	.677	26.86822
2	.843[b]	.711	.669	27.18914

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , # Competitors domest. market, Stage Length
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , # Competitors domest. market

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39233.564	4	9808.391	13.587	.000[a]
	Residual	14438.024	20	721.901		
	Total	53671.588	24			
2	Regression	38147.355	3	12715.785	17.201	.000[b]
	Residual	15524.233	21	739.249		
	Total	53671.588	24			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , # Competitors domest. market, Stage Length
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , # Competitors domest. market
c. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	623.930	64.595		9.659	.000
	Stage Length	-.034	.028	-.187	-1.227	.234
	# Pax Economy	-.054	.023	-.343	-2.310	.032
	# Competitors domest. market	-78.898	12.744	-.727	-6.191	.000
	WTI - Cushing, Oklahoma	-.571	.293	-.232	-1.948	.066
2	(Constant)	607.491	63.944		9.500	.000
	# Pax Economy	-.036	.019	-.230	-1.952	.064
	# Competitors domest. market	-81.078	12.770	-.747	-6.349	.000
	WTI - Cushing, Oklahoma	-.648	.290	-.263	-2.235	.036

a. Dependent Variable: Fare Avg. Economy (ow)

Appendix C: Newport News/Williamsburg International Airport, VA

Table 23 Frontier Airlines entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.352[a]	.124	.112	72.89109
2	.343[b]	.118	.109	73.02961
3	.331[c]	.110	.104	73.23199

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Stops, # Competitors domest. market
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Stops
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length

ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	226800.203	4	56700.051	10.672	.000[a]
	Residual	1604559.488	302	5313.111		
	Total	1831359.691	306			
2	Regression	215362.632	3	71787.544	13.460	.000[b]
	Residual	1615997.059	303	5333.324		
	Total	1831359.691	306			
3	Regression	201030.718	2	100515.359	18.743	.000[c]
	Residual	1630328.973	304	5362.924		
	Total	1831359.691	306			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Stops, # Competitors domest. market
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Stops
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length
d. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.025	44.126		-.205	.838
	Stage Length	.043	.010	.246	4.458	.000
	# Stops	24.878	14.242	.097	1.747	.082
	# Competitors domest. market	-18.905	12.885	-.120	-1.467	.143
	WTI - Cushing, Oklahoma	2.253	.617	.298	3.652	.000
2	(Constant)	-.111	43.789		-.003	.998
	Stage Length	.043	.010	.249	4.518	.000
	# Stops	23.327	14.230	.090	1.639	.102
	WTI - Cushing, Oklahoma	1.574	.409	.208	3.851	.000
3	(Constant)	19.818	42.184		.470	.639
	Stage Length	.046	.009	.268	4.945	.000
	WTI - Cushing, Oklahoma	1.544	.410	.204	3.771	.000

a. Dependent Variable: Fare Avg. Economy (ow)

Appendix D: Palm Spring International Airport, CA

Table 24 Virgin America entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.454[a]	.206	.204	57.86428
2	.490[b]	.241	.236	56.69079
3	.502[c]	.252	.245	56.34004

a. Predictors: (Constant), Stage Length
b. Predictors: (Constant), Stage Length, WTI - Cushing, Oklahoma

c. Predictors: (Constant), Stage Length, WTI - Cushing, Oklahoma
, # Pax Economy

ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	263496.559	1	263496.559	78.696	.000[a]
	Residual	1014527.431	303	3348.275		
	Total	1278023.990	304			
2	Regression	307442.724	2	153721.362	47.831	.000[b]
	Residual	970581.266	302	3213.845		
	Total	1278023.990	304			
3	Regression	322589.639	3	107529.880	33.876	.000[c]
	Residual	955434.350	301	3174.200		
	Total	1278023.990	304			

a. Predictors: (Constant), Stage Length
b. Predictors: (Constant), Stage Length, WTI - Cushing, Oklahoma

c. Predictors: (Constant), Stage Length, WTI - Cushing, Oklahoma
, # Pax Economy
d. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	125.768	9.780		12.860	.000
	Stage Length	.049	.006	.454	8.871	.000
2	(Constant)	20.668	29.994		.689	.491
	Stage Length	.050	.005	.462	9.208	.000
	WTI - Cushing, Oklahoma	1.163	.314	.186	3.698	.000
3	(Constant)	22.449	29.819		.753	.452
	Stage Length	.047	.006	.435	8.469	.000
	WTI - Cushing, Oklahoma	1.224	.314	.195	3.902	.000
	# Pax Economy	-.002	.001	-.113	-2.184	.030

a. Dependent Variable: Fare Avg. Economy (ow)

Table 25 Frontier Airlines entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.609[a]	.370	.359	56.28494

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Pax Economy , # Stops, # Competitors domest. market

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	516278.428	5	103255.686	32.593	.000[a]
	Residual	877534.598	277	3167.995		
	Total	1393813.026	282			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Pax Economy , # Stops, # Competitors domest. market
b. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-29.001	36.376		-.797	.426
	Stage Length	.057	.006	.549	10.329	.000
	# Stops	-20.333	10.898	-.111	-1.866	.063
	# Pax Economy	-.003	.001	-.167	-3.015	.003
	# Competitors domest. market	17.809	8.464	.125	2.104	.036
	WTI - Cushing, Oklahoma	.979	.402	.145	2.438	.015

a. Dependent Variable: Fare Avg. Economy (ow)

Appendix E: Portland International Airport, OR

Table 26 JetBlue Airways entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.485[a]	.235	.226	41.92108

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Stops, Stage Length, # Competitors domest. market, # Pax Economy

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	224382.618	5	44876.524	25.536	.000[a]
	Residual	731068.949	416	1757.377		
	Total	955451.567	421			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Stops, Stage Length, # Competitors domest. market, # Pax Economy
b. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	202.701	24.550		8.257	.000
	Stage Length	.030	.003	.415	9.213	.000
	# Stops	-79.096	18.034	-.227	-4.386	.000
	# Pax Economy	-.012	.005	-.144	-2.741	.006
	# Competitors domest. market	-18.118	5.251	-.177	-3.450	.001
	WTI - Cushing, Oklahoma	.741	.193	.190	3.837	.000

a. Dependent Variable: Fare Avg. Economy (ow)

Appendix F: Richmond International Airport, VA

Table 27 AirTran Airways entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.622[a]	.387	.378	32.23715
2	.621[b]	.386	.379	32.21393
3	.621[c]	.385	.380	32.19246
4	.619[d]	.384	.380	32.19035

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length, # Stops, # Competitors domest. market
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length, # Stops
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Stops
d. Predictors: (Constant), Stage Length, # Stops

ANOVA[e]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	236820.922	5	47364.184	45.576	.000[a]
	Residual	375163.431	361	1039.234		
	Total	611984.353	366			
2	Regression	236323.549	4	59080.887	56.932	.000[b]
	Residual	375660.804	362	1037.737		
	Total	611984.353	366			
3	Regression	235787.622	3	78595.874	75.839	.000[c]
	Residual	376196.731	363	1036.355		
	Total	611984.353	366			
4	Regression	234800.854	2	117400.427	113.297	.000[d]
	Residual	377183.499	364	1036.218		
	Total	611984.353	366			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length, # Stops, # Competitors domest. market
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length, # Stops
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Stops
d. Predictors: (Constant), Stage Length, # Stops
e. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	151.301	19.009		7.959	.000
	Stage Length	.042	.003	.667	14.984	.000
	# Stops	-27.660	7.539	-.224	-3.669	.000
	# Pax Economy	-.001	.001	-.042	-.710	.478
	# Competitors domest. market	4.529	6.546	.054	.692	.490
	WTI - Cushing, Oklahoma	-.353	.331	-.083	-1.065	.287
2	(Constant)	161.601	11.811		13.682	.000
	Stage Length	.042	.003	.666	14.980	.000
	# Stops	-27.750	7.533	-.225	-3.684	.000
	# Pax Economy	-.001	.001	-.043	-.719	.473
	WTI - Cushing, Oklahoma	-.159	.176	-.038	-.901	.368
3	(Constant)	157.963	10.664		14.812	.000
	Stage Length	.042	.003	.667	15.034	.000
	# Stops	-24.012	5.444	-.195	-4.411	.000
	WTI - Cushing, Oklahoma	-.171	.176	-.040	-.976	.330

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.622[a]	.387	.378	32.23715
2	.621[b]	.386	.379	32.21393
3	.621[c]	.385	.380	32.19246
4	.619[d]	.384	.380	32.19035

4	(Constant)	148.819	5.090		29.240	.000
	Stage Length	.042	.003	.663	15.014	.000
	# Stops	-24.054	5.443	-.195	-4.419	.000

a. Dependent Variable: Fare Avg. Economy (ow)

Table 28 JetBlue Airways entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.502[a]	.252	.197	37.22761
2	.502[b]	.252	.209	36.95913
3	.501[c]	.251	.219	36.72239
4	.492[d]	.242	.221	36.66923
5	.476[e]	.226	.215	36.80070

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length, # Stops, # Competitors domest. market
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length, # Stops
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length
d. Predictors: (Constant), # Pax Economy , Stage Length
e. Predictors: (Constant), Stage Length

ANOVA[f]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31778.179	5	6355.636	4.586	.001[a]
	Residual	94240.837	68	1385.895		
	Total	126019.016	73			
2	Regression	31766.605	4	7941.651	5.814	.000[b]
	Residual	94252.411	69	1365.977		
	Total	126019.016	73			
3	Regression	31621.625	3	10540.542	7.816	.000[c]
	Residual	94397.391	70	1348.534		
	Total	126019.016	73			
4	Regression	30550.126	2	15275.063	11.360	.000[d]
	Residual	95468.890	71	1344.632		
	Total	126019.016	73			
5	Regression	28510.039	1	28510.039	21.052	.000[e]
	Residual	97508.977	72	1354.291		
	Total	126019.016	73			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length, # Stops, # Competitors domest. market
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length, # Stops
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , Stage Length
d. Predictors: (Constant), # Pax Economy , Stage Length
e. Predictors: (Constant), Stage Length
f. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	146.880	41.513		3.538	.001
	Stage Length	.035	.008	.483	4.141	.000
	# Stops	3.757	11.698	.043	.321	.749
	# Pax Economy	.002	.002	.145	1.155	.252
	# Competitors domest. market	1.012	11.078	.012	.091	.927
	WTI - Cushing, Oklahoma	-.445	.573	-.104	-.776	.441
2	(Constant)	149.420	30.607		4.882	.000
	Stage Length	.035	.008	.484	4.190	.000
	# Stops	3.782	11.610	.043	.326	.746
	# Pax Economy	.002	.002	.144	1.160	.250
	WTI - Cushing, Oklahoma	-.413	.450	-.097	-.916	.363
3	(Constant)	150.728	30.149		4.999	.000
	Stage Length	.036	.008	.497	4.600	.000
	# Pax Economy	.002	.002	.124	1.154	.252
	WTI - Cushing, Oklahoma	-.396	.445	-.093	-.891	.376
4	(Constant)	125.149	9.235		13.551	.000
	Stage Length	.036	.008	.510	4.767	.000
	# Pax Economy	.002	.002	.132	1.232	.222
5	(Constant)	131.144	7.877		16.649	.000
	Stage Length	.034	.007	.476	4.588	.000

a. Dependent Variable: Fare Avg. Economy (ow)

Appendix G: Sarasota Bradenton International Airport, FL

Table 29 JetBlue Airways entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.148[a]	.022	-.044	81.93407
2	.148[b]	.022	-.030	81.38695
3	.142[c]	.020	-.019	80.93122
4	.131[d]	.017	-.008	80.51951
5	.097[e]	.009	-.003	80.31936
6	.000[f]	.000	.000	80.18741

ANOVA[g]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11195.409	5	2239.082	.334	.891[a]
	Residual	496776.226	74	6713.192		
	Total	507971.635	79			
2	Regression	11183.912	4	2795.978	.422	.792[b]
	Residual	496787.723	75	6623.836		
	Total	507971.635	79			
3	Regression	10182.104	3	3394.035	.518	.671[c]
	Residual	497789.531	76	6549.862		
	Total	507971.635	79			
4	Regression	8750.532	2	4375.266	.675	.512[d]
	Residual	499221.103	77	6483.391		
	Total	507971.635	79			
5	Regression	4778.011	1	4778.011	.741	.392[e]
	Residual	503193.624	78	6451.200		
	Total	507971.635	79			
6	Regression	.000	0	.000	.	.[f]
	Residual	507971.635	79	6430.021		
	Total	507971.635	79			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Pax Economy , # Competitors domest. market, # Stops
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy , # Competitors domest. market, # Stops
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Competitors domest. market, # Stops
d. Predictors: (Constant), # Competitors domest. market, # Stops
e. Predictors: (Constant), # Stops
f. Predictor: (constant)
g. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	99.151	122.938		.807	.423
	Stage Length	-.003	.071	-.005	-.041	.967
	# Stops	27.019	39.779	.085	.679	.499
	# Pax Economy	-.011	.029	-.046	-.383	.703
	# Competitors domest. market	17.480	22.417	.097	.780	.438
	WTI - Cushing, Oklahoma	-.242	.495	-.061	-.489	.626
2	(Constant)	96.014	96.140		.999	.321
	# Stops	26.513	37.605	.083	.705	.483
	# Pax Economy	-.011	.028	-.047	-.389	.698
	# Competitors domest. market	17.569	22.165	.097	.793	.430
	WTI - Cushing, Oklahoma	-.246	.484	-.062	-.509	.612
3	(Constant)	81.076	87.639		.925	.358
	# Stops	29.578	36.564	.093	.809	.421
	# Competitors domest. market	19.178	21.653	.106	.886	.379
	WTI - Cushing, Oklahoma	-.223	.477	-.056	-.468	.641
4	(Constant)	73.838	85.822		.860	.392
	# Stops	31.795	36.071	.100	.881	.381
	# Competitors domest. market	16.023	20.469	.088	.783	.436
5	(Constant)	134.556	36.633		3.673	.000
	# Stops	30.952	35.965	.097	.861	.392
6	(Constant)	165.121	8.965		18.418	.000

a. Dependent Variable: Fare Avg. Economy (ow)

Appendix H: Westchester County Airport, NY

Table 30 AirTran Airways entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.321[a]	.103	.078	43.64968
2	.321[b]	.103	.083	43.53152
3	.321[c]	.103	.088	43.41678

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Stops, Stage Length, # Competitors domest. market, # Pax Economy
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Stops, Stage Length, # Competitors domest. market
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Stops, Stage Length

ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39240.778	5	7848.156	4.119	.001[a]
	Residual	341047.767	179	1905.295		
	Total	380288.545	184			
2	Regression	39189.711	4	9797.428	5.170	.001[b]
	Residual	341098.834	180	1894.994		
	Total	380288.545	184			
3	Regression	39100.507	3	13033.502	6.914	.000[c]
	Residual	341188.038	181	1885.017		
	Total	380288.545	184			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Stops, Stage Length, # Competitors domest. market, # Pax Economy
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Stops, Stage Length, # Competitors domest. market
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Stops, Stage Length
d. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	247.273	40.446		6.114	.000
	Stage Length	-.033	.019	-.147	-1.775	.078
	# Stops	-37.836	18.196	-.206	-2.079	.039
	# Pax Economy	-.009	.057	-.017	-.164	.870
	# Competitors domest. market	1.785	7.610	.019	.235	.815
	WTI - Cushing, Oklahoma	-.542	.277	-.157	-1.960	.052
2	(Constant)	244.386	36.300		6.732	.000
	Stage Length	-.032	.018	-.143	-1.819	.071
	# Stops	-36.037	14.466	-.196	-2.491	.014
	# Competitors domest. market	1.635	7.534	.017	.217	.828
	WTI - Cushing, Oklahoma	-.544	.276	-.158	-1.973	.050
3	(Constant)	250.007	25.357		9.860	.000
	Stage Length	-.032	.018	-.143	-1.818	.071
	# Stops	-36.097	14.425	-.196	-2.502	.013
	WTI - Cushing, Oklahoma	-.516	.243	-.150	-2.123	.035

a. Dependent Variable: Fare Avg. Economy (ow)

Table 31 JetBlue Airways entry

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.541[a]	.292	.263	42.97654
2	.541[b]	.292	.270	42.75674
3	.539[c]	.290	.276	42.58979
4	.529[d]	.280	.273	42.68060

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Competitors domest. market, # Pax Economy
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Pax Economy
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy
d. Predictors: (Constant), WTI - Cushing, Oklahoma

ANOVA[e]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	73941.654	4	18485.413	10.008	.000[a]
	Residual	179157.377	97	1846.983		
	Total	253099.031	101			
2	Regression	73941.431	3	24647.144	13.482	.000[b]
	Residual	179157.600	98	1828.139		
	Total	253099.031	101			
3	Regression	73523.860	2	36761.930	20.267	.000[c]
	Residual	179575.170	99	1813.891		
	Total	253099.031	101			
4	Regression	70935.687	1	70935.687	38.941	.000[d]
	Residual	182163.343	100	1821.633		
	Total	253099.031	101			

a. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Competitors domest. market, # Pax Economy
b. Predictors: (Constant), WTI - Cushing, Oklahoma
, Stage Length, # Pax Economy
c. Predictors: (Constant), WTI - Cushing, Oklahoma
, # Pax Economy
d. Predictors: (Constant), WTI - Cushing, Oklahoma
e. Dependent Variable: Fare Avg. Economy (ow)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	238.587	64.297		3.711	.000
	Stage Length	-.017	.036	-.045	-.472	.638
	# Pax Economy	.074	.081	.089	.917	.361
	# Competitors domest. market	-.104	9.473	-.001	-.011	.991
	WTI - Cushing, Oklahoma	-1.283	.251	-.492	-5.108	.000
2	(Constant)	238.102	46.494		5.121	.000
	Stage Length	-.017	.035	-.045	-.478	.634
	# Pax Economy	.074	.079	.090	.936	.352
	WTI - Cushing, Oklahoma	-1.284	.235	-.492	-5.475	.000
3	(Constant)	218.280	20.931		10.429	.000
	# Pax Economy	.088	.074	.106	1.195	.235
	WTI - Cushing, Oklahoma	-1.298	.232	-.497	-5.602	.000
4	(Constant)	232.927	16.999		13.702	.000
	WTI - Cushing, Oklahoma	-1.382	.221	-.529	-6.240	.000

a. Dependent Variable: Fare Avg. Economy (ow)

Appendix I

Table 31 Stage 2 Overall Results: Airline Fares Increase

Airport	LCC Entry	Other Airlines		Stage Length	# Pax econ.	# Comp.	# Stops	WTI	Beta Coefficients
McGhee Tyson Airport, TN	Frontier Airlines	DL, US,AA, UA, AirTran	R^2=0.103	+	-	-			Airlines' fares will increase with an increase in the stage length, and decreases in the number of competitors on the market and number of passenger in economy class.
McGhee Tyson Airport, TN	AirTran Airways	DL, US, US	R^2=0.711		-	-		-	Airlines' fares will increase with decreases in number of passengers, number of competitors in the market, and the oil price.
Newport News, VA	Frontier Airlines	DL, US, UA	R^2=0.110	+				+	Airlines' fares will increase with increases in the oil price and the stage length.
Palm Spring International Airport, CA	Virgin America	AA, DL, US, Frontier	R^2=0.252	+	-			+	Airlines' fares will increase with the increases in the stage length and the oil price, and decreases in the number of economy passengers
Palm Spring International Airport, CA	Frontier Airlines	AA, DL, US, Virgin	R^2=0.37	+	-		-	+	Airlines' fares will increase with increases in the stage length and the oil price. Fares will decrease with decreases in the number of stops and the number of economy passengers.
Portland International Airport, OR	JetBlue Airways	DL, US, US	R^2=0.235	+	-	-	-	+	Airline' fares will increase with increases in the stage length and the oil price, and decreases in the number of economy passengers, number of stops and number of competitors.
Richmond International Airport, VA	AirTran Airways	DL, US, US, AA	R^2=0.384	+			-		Airlines' fares will increase with increases in the stage length and decreases in the number of stops.
Richmond International Airport, VA	JetBlue Airways	DL, US, UA, AA, AirTran	R^2=0.226	+					Airlines' fares will increase with increases in the stage length.
Westchester County Airport, NY	AirTran Airways	DL, US, UA, AA	R^2=0.103	-			-	-	Airlines' fares will increase with decreases in the oil price, number of stops and the stage length.
Westchester County Airport, NY	JetBlue Airways	DL, US, UA	R^2=0.280					-	Airlines' fares will increase with decreases in the oil price.

Sarasota Bradenton International Airport did not display the significant relations between the studies variables.

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